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## SPECIAL ARTICLES



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# Pasteur and the Science of Bacteriology

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On account of the work of Pasteur in the field of Bacteriology requires to be prefaced by the observation that prior to his time the foundations of this science had not been laid. To very few men is given the opportunity of charting the course, however roughly, of a new branch of science in the immense ocean of the unknown. Still fewer possess the unconquerable spirit and the genius to strike out boldly and surely and to reach the haven of immense achievement and solid and enduring contribution to science and human welfare. This however was the destiny of Pasteur, and to-day one hundred years after his birth, and nearly twenty-eight years after his death he is in even the most remote corners of the world being acclaimed as one of the greatest benefactors of humanity who has ever lived.

Pasteur's preliminary scientific training was very broad and thorough. He took immense pains to acquire a substantial background of mathematics and the natural sciences, physics, chemistry and biology. There was of course very much less differentiation of, and distinction between, these three branches of natural science seventy-five years ago. It was quite possible for a scholar of that time to become an authority in all three fields, to keep abreast of new developments and at the same time to make substantial contributions to all of them.

Pasteur's earliest work was in the field of chemistry. Between 1845 and 1855 his attention was directed almost entirely to the solution of problems which were only indirectly related to biology and to bacteriology. His studies in stereochemistry, and subsequently in fermentation proved to be the bridge over which he crossed, to enter the realm of bacteriology. The authority of the

great chemists Berzelius and Liebig was such, at this time, that their theories of the nature of fermentation were everywhere accepted. Liebig's explanation of chemical decomposition or fermentation was that a ferment or influence (this being an unstable organic substance), in decomposing, set in motion, as a result of the rupture of its own elements, the loosely bound molecules of the fermentable matter. In other words, the part of the yeast which produced fermentation was an altered dead portion acting upon sugar. According to this it was not the result of vital activity, in other words it was not a physiological process. Pasteur as was his invariable custom submitted the question to experimentation. Through scientific investigation he felt convinced, this problem could be solved and in no other way. Fruitless speculation had too long delayed the elucidation of the question. Pasteur was at this time, 1856, Professor and Dean of the Faculte des Sciénces at Lille. Here many opportunities for the study and investigation of the processes of fermentation presented themselves.

He examined with his microscope the fluids in which fermentation was proceeding. He observed the shape of the living micro-organisms in these fluids. He correlated his microscopic findings with the results obtained on many occasions in the process of fermentation with different fluids containing a variety of micro-organisms. Pasteur established the fact that when certain micro-organisms were present the fermentative changes resulted in the recovery of satisfactory products; when other forms were present, the contrary was the case. Schwann and Cagniard-Latour, the latter a French physicist of distinction, had prior to this time observed that the ferment was composed of yeast cells, and that they reproduced by budding. They also speculated that these yeast cells, probably acted upon sugar through some effect of their vegetation. Pasteur continued his experiments on both lactic acid and alcoholic fermentation and soon he had convinced himself that fermentation of any sort was due to the activities of a living micro-organism. He found that different types of fermentation were due to different varieties of these micro-organisms. In this, as in other investigations, Pasteur presented the results of adequate and carefully controlled experiments, where others had been satisfied with a few observations and much speculation. The paper on lactic acid fermentation was presented before the Lille Scientific Society in August, 1857. Later during the same year a paper on alcoholic fermentation was read before the Academie des Sciénces in which he declared that his experiments showed that the splitting of

sugar into alcohol and carbonic acid was due to the activities of organized living agents, "microscopic globules." It was a physiological process.

These were the first correlated studies of morphology and biochemical activities of bacteria ever made and were completed at a time when there was no technique for the isolation of bacteria in pure culture, no methods of sterilization and no definite criteria for the differentiation of bacterial species. Parenthetically, it may be added, it was also prior to the time when any bacterial species had indubitably been shown to be the etiological agent of a disease process in man or lower animals.

At this time a firm belief in spontaneous generation (generatio aequivoca) was not the exclusive possession of children, pseudo-philosophers or the illiterate. On the contrary it was very widely held. The doctrine, *'omne vivum e vivo'* or *'omne vivum ex ovo,'* while strongly supported by the earlier work of Spallanzani had many more enemies than friends. For the next five years (1865) Pasteur devoted himself assiduously to scientific experimentation aimed at the elucidation of this problem as well as continuing his studies of fermentation and putrefaction. In 1861 in conducting experiments on butyric acid fermentation Pasteur made the very fundamental observation that certain micro-organisms developed only in the absence of free oxygen. Thus the first discovery relating to anaerobiosis as well as the varying oxygen requirements of different bacteria was made.

In the meantime a very bitter scientific controversy was being waged about the question of spontaneous generation—several scientific workers in France as well as others elsewhere were not disposed to admit that Pasteur was right when he concluded as a result of a long series of experiments, that the appearance of living micro-organisms in fluid contained in flasks, etc., was due to the contamination of the fluid by air containing organized bodies.

Infusions of organic matter were made. They were clear when first prepared. They were then exposed to heat, even to boiling. Unless carefully protected from dust particles they soon became cloudy and if examined were found to contain innumerable micro-organisms. Pasteur's own words quite explicitly and concisely indicate how he once and for all disposed of the question of spontaneous generation. He wrote:

"I place a portion of that infusion into a flask with a long neck, like this one. Suppose I boil the liquid and leave it to cool. After a few days, mouldiness or animalculæ will develop in the

liquid. By boiling, I destroyed any germs contained in the liquid or against the glass; but that infusion being again in contact with air, it becomes altered, as all infusions do. Now suppose I repeat this experiment, but before boiling the liquid, I draw (by means of an enameller's lamp) the neck of the flask into a point, leaving, however its extremity open. This being done, I boil the liquid in the flask, and leave it to cool. Now the liquid of this second flask will remain pure not only for two days, a month, a year, but three or four years—for the experiment I am telling you about is already four years old, and the liquid remains as limpid as distilled water. What difference is there, then, between those two flasks? They contain the same liquid, they both contain air, both are open! Why does one decay and the other remain pure? The only difference between them is this: in the first case, the dusts suspended in air and their germs can fall into the neck of the flask and arrive into contact with the liquid, where they find appropriate food and develop; thence microscopic beings. In the second flask, on the contrary, it is impossible, or at least extremely difficult, unless the air is violently shaken, that dusts suspended in air should enter the flask; they fall on its curved neck. When air goes in and out of the flask through diffusions or variations of temperature, the latter never being sudden, the air comes in slowly enough to drop the dusts and germs that it carries at the opening of the neck or in the first curves.

"This experiment is full of instruction; for this must be noted, that everything in air, save its dust, can easily enter the flask and come into contact with the liquid. Imagine what you choose in the air—electricity, magnetism, ozone, unknown forces even, all can reach the infusion. Only one thing cannot enter easily, and that is dust, suspended in air. And the proof of this is, that if I shake the flask violently two or three times, in a few days it contains animalculæ or mouldiness. Why? Because air has come in violently enough to carry dust with it.

"And, therefore, gentlemen, I could point to that liquid and say to you, I have taken my drop of water from the immensity of creation, and I have taken it full of the elements appropriated to the development of inferior beings. And I wait, I watch, I question it, begging it to recommence for me the beautiful spectacle of the first creation. But it is dumb, dumb since these experiments were begun several years ago; it is dumb because I have kept it from the only thing man cannot produce, from the germs which float in the air, from Life, for Life is a germ and a germ is Life. Never

will the doctrine of spontaneous generation recover from the mortal blow of this simple experiment."

Pasteur's work on fermentation was a logical preliminary to his attempt in 1864 to determine the cause of the disease of wines which entailed very considerable economic losses in certain districts in France. He concluded after careful morphological studies of the micro-organisms found in the wines that "the alterations of wines are co-existent with the presence and multiplication of microscopic vegetations." Certain concrete proposals were made by Pasteur at this time, which had they been adopted would have controlled the undesirable fermentative activities in wines. The thermal death point of these micro-organisms was ascertained very definitely. These were the first accurate experimental studies of thermal death points of bacteria. Between the years 1865 and 1870 Pasteur was engaged in a series of investigations in an effort to discover the cause of an epidemic which was ravaging the silkworms and threatening the very life of sericiculture in France. This fascinating chapter of achievement properly belongs in the category of work in Protozoology and so will not be dealt with here.

We have now reached the place in Pasteur's scientific life where he was about to scale the heights and to achieve enduring fame. The philosophic conception that certain human and animal diseases which manifested pronounced communicability and appeared in pandemic or epidemic outbursts, were really due to living agents or *contagium vivum* was expounded at regular intervals. About 1666 Robert Boyle, an English physicist, at Oxford had expressed the conviction that the solution of the problem of the nature of ferments would do much to explain certain phenomena of disease. Pasteur was very greatly impressed by this and in his mind's eye saw clearly the possible relationship of minute living agents to communicable diseases. But vague speculation was to have no place in the programme which Pasteur marked out to test the validity of this conception. Accurate and careful observation, correlated with splendidly conceived and wisely controlled experiment, was alone depended upon to reveal the truth.

The work in 1871 on cultures of yeasts of value in brewing led to the development of an exact technique for sterilization, the so-called method of pasteurization or fractional sterilization. This added much to the methodology of the embryonic science of bacteriology. In 1874 before the etiological relationship of any bacterial species to a disease process had been conclusively established

Joseph Lister, later Lord Lister, a Scottish surgeon, who had read and profited by Pasteur's work on lactic acid fermentation wrote to Pasteur as follows:

"My Dear Sir,—Allow me to beg your acceptance of the pamphlet, which I send by the same post, containing an account of some investigations into the subject which you have done so much to elucidate, the germ theory of fermentative changes. I flatter myself that you may read with some interest what I have written on the organism which you were the first to describe in your "Memoir on lactic acid fermentation."

"I do not know whether the "Records of British Surgery" ever meet your eye. If so, you will have seen from time to time notices of the antiseptic system of treatment, which I have been labouring for the last nine years to bring to perfection.

"Allow me to take this opportunity to tender you, my most cordial thanks for having, by your brilliant researches, demonstrated to me the truth of the germ theory of putrefaction, and thus furnished me with the principle upon which alone, the antiseptic system can be carried out. Should you at any time visit Edinburgh, it would, I believe, give you sincere gratification to see at our hospital how largely mankind is being benefited by your labours.

"I need hardly add that it would afford me the highest gratification to show you how greatly surgery is indebted to you.

"Forgive the freedom with which a common love of science inspires me, and

"Believe me, with profound respect,

"Yours very sincerely,

"JOSEPH LISTER."

The foundation, first, of antiseptic and later of aseptic surgery were thus laid by Pasteur. He at this time very definitely advised the sterilization of all surgical instruments before use by passing them through a living flame and he also recommended the sterilization of all surgical dressings by heating to a temperature of 150 degrees C. before being used. (He also proposed that plugs of cotton wool should be used to stopper glass vessels containing sterile fluids to prevent the entrance of organic matter containing living micro-organisms.)

In 1838 Delafond of the Alfort Veterinary College saw in the blood of cattle that had died of anthrax "little rods" to which he attached no significance. In 1850 Davaine and Royer repeated the

work of Delafond but without appreciating its significance. Davaine in 1863 read Pasteur's paper on (the cause of) butyric acid fermentation and was greatly impressed by it, and in 1863 he again examined blood from sheep that had died of anthrax and found in it tiny bodies which he called "bacteridia." He announced that he believed these were the cause of anthrax. Various workers now took up the question and very soon the whole subject was completely obscured by contradictory and conflicting results.

Pasteur undertook to investigate the question. He took a small amount of blood from an animal that had died of anthrax, and with all asecptic precautions planted it in a sterile flask containing a slightly alkaline, sterile culture medium. In this medium he grew pure (single) cultures of anthrax bacilli. He noted the characteristic growth of these micro-organisms. He sub-cultured his growth by carrying over from flasks in which the bacilli were growing, a few drops to other flasks of sterile culture medium thus seeding them, and permitting new generations of these microbes to appear.

The next step consisted in establishing that the germs which were thus grown in an artificial culture medium were really the causative agents of the disease anthrax. This was done by the injection into susceptible animals of a drop of culture material from the flasks. The animals so injected developed anthrax and from their blood anthrax bacilli were recovered. Thus the etiological relationship of a species of micro-organism to the disease anthrax was conclusively established. The way was now prepared for the complete investigation, through the application of similar methods, of all the communicable diseases. Pasteur announced it as his belief that "Each infectious disease is produced by the development within the organism of a special microbe." Between 1877, when Pasteur completed his work on anthrax, and 1895, the year of his death, the causative agents of nearly all the important communicable diseases were discovered.

To this very remarkable accomplishment Pasteur contributed the lion's share in elaborating technical procedures, formulating criteria by which results could be appraised and by a rigid insistence on the necessity for most exact experimental verification of all opinions expressed or views advanced. Such remarkable achievements would in the vast majority of cases have marked the climax of scientific contribution. Such, however, was not the case with Pasteur, his great vision led him to develop specific

methods of inestimable benefit to the human race for the prevention of many communicable diseases.

In all of this he was guided by ideals which were embodied in the declaration "Blessed is he who carries within himself a God, an ideal, and who obeys it; ideal of art, ideal of science, ideal of the gospel virtues, therein lie the springs of great thoughts and great actions; they all reflect light from the Infinite." In no small measure the improvements noted in the state of public health in the last two decades are the fruits of Pasteur's labors. Thus through the application of the methods of preventive medicine in the past fifty years the span of life on the average has increased 15 years. Forty-one years being the average length of life in 1870, whereas it was 56 in 1920. In the past twenty years also the infant mortality rate has been reduced one-third, the tuberculosis death-rate cut in half and the deaths from typhoid fever reduced to one-fifth of their former number. These are some of the reasons why a grateful posterity should pause to pay homage to the memory of Louis Pasteur.

# Hydrophobia: Four Centuries Ago

By The Honourable William Renwick Riddell, LL.D., F.R.S.C., Etc., *President, Canadian Social Hygiene Council.*

THE researches of Pasteur in respect of Hydrophobia are epoch-making: he cannot, indeed, be said to have found the immediate cause of Rabies, and the world has still to be content with knowing the condition, but he has found a perfect prophylactic.

Before his discoveries, science was not much further advanced in respect of Canine Madness than in the times of the Greek and Roman writers, Hippocrates, Galen, Celsus.

It may be of interest to give the views of that fine flower of the Renaissance, Girolamo Fracastoro of Verona, who wrote in the first half of the 16th century, and was at the very top of his profession.

He gives a description of the disease in man and its treatment, in his celebrated Latin prose work published at Verona, 1546, "De Contagionibus, et Contagiosis Morbis et eorum Curatione," to which his work in 24 chapters, "De Sympathiâ et Antipathiâ Rerum" was avowedly written as an Introduction[1]. He speaks of rabies in the dog in his Latin dactylic hexameter poem, "Alcon, Sive de Cura Canum Venaticorum"—the precise date of the publication of this poem is uncertain.

In the First Book of the prose work of 13 chapters is a definition followed by a classification of Contagions: in the Second of 15 chapters, Chapter X is "De rabie"; and in the Third of 11 chapters, Chapter IX is "De curatio Rabidorum"—the First Book may be neglected for the purpose of this article.

## Description.

At the very beginning of Lib II. cap X, Fracastoro agrees with Galen[2] that it does not occur *per se* except in dogs and with Aristotle that all animals bitten by rabid dogs necessarily become rabid except man alone. This, he explains (adding that animals so bitten die) by the "feritas," wildness, by and through which they resemble the dog, while "the nature of man is far different from this wildness and resemblance, for which reason man has no immediate

'analogia' for taking the contagion—whence it happens that not all who are bitten even become rabid, but many through the advantage of their natural (*ex se*) temperament either do not contract the disease, or if they do, they survive."

By an ingenious argument, Fracastoro concludes that the "analogia" in man for the contagion of rabies is not the solid parts but the melancholic humor. "Analogia" means analogy or likeness; and in his work "De Sympathiâ, etc.", the author explains that like attracts like; he means, here, that the contagion of Rabies is attracted to and finds its proper field of action in the melancholia; he adds that the dog "valde melancholicum animal est"—is a very melancholic animal. He is here, of course, implying the current theory of the four humours of the body on the proper admixture, crasis, temperamentum[3] of which so much of bodily health was supposed to depend—Sanguis (Blood). Pituita or Phlegma (Phlegm, Rheum), Chole or Cholera (Yellow Bile) and Melancholia (Black Bile).

Rabies is not contracted from every kind of touch, or by "fomes" or at a distance but "then only, when the skin is so lacerated by the dog's bite that blood is drawn just as though the contagion occurs in the blood itself by the contact of the tooth and spume of the rabid animal."

"Moreover, it creeps so slowly and with such delay that rarely is the infection produced before the twentieth day, generally after the thirtieth, in many not till after four or six months, in some even after a year, and some are said to manifest it after five years. I myself have seen a boy who manifested the contagion, eight months after he had been bitten."[4]

This gives Fracastoro an opportunity to philosophize *more suo*. "Since this contagion is not transmitted by 'fomes' nor does it appear in the skin by simple contact, but requires actual laceration of the skin, we must consider that the seeds of it are not very viscous (*lenta*) and are perhaps too crass to hide themselves in the foramina, and so cannot be agglutinated unless the spume in which the 'seminaria' lie is mixed with the blood itself."

The long delay in manifesting itself is due to its field of action —as "the melancholia is sparser and frigid and dry and less apt to putrefy, it can preserve the 'seminaria' longer."

Pending the manifestation of the disease "no fever is felt, or any other evil, the patient is ignorant that mischief is latent, and he feels it almost for the first time when it reaches the heart." The reason of this, too, is given—"this contagion excites no fever

except at the very end, inasmuch as it is produced gradually (*sensim*) and what evaporates is not carried forthwith to the heart but long after, or it is expelled—it is propagated through part after part to the inside and at length to the praecordia; when it reaches there, it both excites fever and tears the transverse septum and the heart itself and brings on at length furor and death." In another part of this chapter a vivid description is given of the manifestations "quum ea (contagio) ad cor pertingit"—"it strikes the man with incredible torture, the heart and praecordia are torn (*vellicantur*), the sick man can neither stand nor be still, but is rushed hither and thither like a madman, he tears his body with his hands, he has a fearful (*immense*) thirst, but the greatest affliction is that the patient has such a fear of water and all liquids that he would rather die than drink or be taken to the water—then, too, he bites others, covering them with spume; his eyes are wild, and at length worn out, he breathes out his life in misery."[5]

The well known prodomic symptoms in the dog so well described by Youatt[6] are explained—"Dogs are in the highest degree dry (*sicci*) and of adust blood, consequently they are at first trist after the fashion of melancholics, and are solitary; then little by little, the blood heating, they become inflamed against everything, they begin to hate everything, and at length in anger they bite; the eyes are red, the mouth foams, and they are carried into furor."

It may be well to pause here and see what precisely is meant—and that requires us to get into the atmosphere of Fracastoro.

He adopts in his "De Sympathiâ, etc.", cap. V, the atomic theory of Democritus and Epicurus "whom our own Lucretius has followed"—every body continually sends off insensible particles "athomos," "effluxiones," like itself. Assume that putrefaction sets in any body—and in Fracastoroo's philoosophy every contagion imparts a putrefaction (though not *vice versâ*)—the atoms sent off will be of the nature of the putrefaction; if the putrefaction be but superficial, the atoms will be too few to do mischief, but if it be in the substance, "*conclusa,*" the case may be different. If, indeed, the effluent atoms are dry they may not agglutinate, but will disappear singly; if, however, they are glutinous, they will combine and form "seminaria," seed-beds, of contagion. These "seminaria" may act at once in a body to be infected; or they may be deposited on the surface or within the pores of some substance, and thus be preserved with all or much of their virulence for months or even years, to be called into activity as occasion offers. Such substances

on or in which the "seminaria contagionis" settle are called "fomites" (singular "fomes," literally tinder or touch-wood, by Fracastoro also applied to the fuse of a firelock)—they are cloth, bedclothes, wood, etc.[7]

Some contagions have a "spiritual species" enabling them to act at a distance, like the lethal "Catablepha" which can kill a man 1,000 yards away by its glance.[8]

"Seminaria" being formed, they are attracted by their like, their "analogia"; and may at once begin their deadly work in the "analogia." Contagions are of three kinds in respect of infection. (1) all contagions act by contact; (2) some of these also by "fomes"; and (3) a few of these latter also at a distance. Rabies is of the first kind acting by contact only; and that only *sub modo*, because its seeds are very slightly viscous and cannot, therefore, agglutinate on a surface, while they are too crass to be able to penetrate the pores of the skin[9] as most contagions can—consequently to enable the seeds of Rabies to agglutinate they must be brought in actual contact with the blood itself. Fracastoro does not indicate that he thought the disease might be conveyed by incidence of the seminaria-bearing spume with the blood in any other way than by the bite of a dog actually lacerating the skin and drawing blood; but his theory calls for the contagion to be conveyed by an application of the spume to the blood—and, of course, we know such to be the fact. A very curious popular delusion—which I have not met elsewhere—seems to be accepted by the author. He says: "They say (*ferunt*), too, that if anyone who had formerly been bitten by a rabid dog should lie under a sorb tree[10], he would have a recurrence of the rabies" (*rursus in rabiem verti*). An explanation of this phenomenon is made which I give in full as a good example of scientific reasoning four hundred years ago. "Why, then, those who lie under a sorb tree are turned rabid again, if they were rabid at some previous time, has a similar latent cause, at all events if current statements are to be believed. There is nothing to prevent the vapors which constantly exhale from the tree—somewhat styptic as they are, and, if one may say so, melancholic—when they are carried to the man and heated within (*intus calefactos*) to be able to produce the same effect as the "seminaria" of rabies, more particularly in the one who becomes rabid again by reason of the remaining diathesis" (*propter relictam dispositionem*).

The cause of the horror or water, etc., puzzles the author—"Why both the dogs themselves and those bitten by one have such

a fear of liquids—whence they are called 'hidrophoni,"[11] presents a difficulty, the reason is obscure. We should not accept what many assert, which even Aetius[12] seems to believe, that they are in such terror of water because it seems to them that they see certain puppies (*catulos*) in the water—for some of those who had begun to fear water, being asked whether there was anything of the kind to be seen, answered that they could see nothing of the sort.[13] But is it the same sort of thing as happens in some other diseases, i.e., a disgust for something or other arising from indisposition of the stomach or tongue—which occurs in those seized by rabies? Or is it rather that there is no defect or (abnormal) disposition in stomach or tongue—for they are thirsty, and so far as the tongue is concerned, they even seek liquids—but the defect is rather in the phantasy?

A sign of this is that they desire liquids which they do not wish to look at or to touch even as a drink.

It is perhaps the case (as we have said in the chapters De Sym pathia[14]) that the phantasy excites memory of some of the things which are wont to cause fear—this may well happen in rabies, for spume is seen around their mouths and, especially, their hearts melt (*et corde praecipue liquescunt*), from these a certain phantasy is produced of liquid destroying (*extinguentis*) them, whence arises a fear as often as they see or touch liquids or even hear it suggested to give them liquids.

In the sick, indeed, there is occasioned a phantasy of horrible things from small occasions, as often we see the sick looking at small figures on the walls, from the impression (*subimaginari*) that they see wolves and dogs, they cry out and order them to be removed and (as we have said in De Sympathiâ) those things which are dried (*exsiccata*) may desire the humid and may attract it, the form remaining according to nature *per se*, although it is otherwise in act and *per accidens*. Indeed, when siccity has proceeded to such an extent that the form no longer preserves its nature but has fallen away from it, then the very dry themselves not only do not desire the humid but abhor them as contraries and renounce them: just as happens with those near death, when they have such an abhorance of all food and drink that nothing can be offered them more detestable and horrible than food and drink, since their members have now been deprived of their nature, in the same way, so much is done in rabies by exsiccation that the proper nature becomes collapsed and it looks upon what it was accustomed to receive as suitable and good, now as contrary and

horrible; and the phantasy produces not only a dislike of drinking any liquid whatever but an actual abhorrence. It is obvious that those affected by rabies become dried out (*exsiccari*) for they even fall into convulsions from siccity."

This chapter containing the description of the disease ends with the sapient words:—"Atque haec de rabie probabiliter dicta sunt"—and what has been said here of rabies is advanced as probable only.

## Treatment.

In Lib III, C. IX, "De Curatione Rabidorum," is given the treatment of those bitten by rabid dogs—the chapter begins:—"There are certain diseases in which unless help is given on the spot as they make their appearance, all medicine will be too late—such are Carbunculi (which the Greeks call Anthrax) and Gangrenes—and especially Rabies of which we are now to speak"; and consequently these diseases should be known to all as well as the remedies which should be exhibited at once.

As though that were not sufficiently terrifying, Fracastoro proceeds: "In Rabies the priests have a better way than physicians; to those who have been bitten when they are brought to them at once, they not only give the consolations of religion but exercising the functions of the medical man and making use of his instruments, they themselves cauterize the place. Therefore, the very first thing that should be generally known is that the bitten part is to be burnt if possible on the spot. It would indeed be better if after the wound is scarified a large cupping glass were applied whereby the virus is extracted and then the wound burnt so deeply that you think the 'seminaria' are reached—this observation being borne in mind that it should be more free where there is much flesh, less so where are many nerves[15] and veins."

The cautery may be made with glowing iron or silver or gold: if the actual cautery be considered too severe (*nimis impium*) by anyone you may effect the object by caustic[16] medicaments. When the place is cauterized, take care that the crust fall away by a cabbage leaf anointed with butter.[17] and in the meantime apply unguents which are at the same time evocative and exsiccant if by chance there should be any remains of the "seminaria" around the locus. All this is to be done at the very beginning. It is not to be ignored that the principia[18] of the disease are very ambiguous and hidden. In some cases the principium is extended to two days,

in others to four, in some even longer according as the disease is more or less acute. Therefore it is of importance to recognize the disease and how long the principium extends, for if the proper remedies are applied during that time, the whole disease will be destroyed. If you think the principium already past and the contagion to have effected deep roots (*altius radices*) the locus is not to be cauterized because by that means the poison will be carried further in[19] but I advise that you scarify and apply evocant and exsiccant plasters not, however, producing blisters—such a preparation as the following:—

R/
Galbani
Serapini
Opopanacis — ana unc. s.
Euphorbii dr. j.
Iridis
Xiridis
Aristolochiæ
Gentianæ — ana dr. j.
Nitri
Sulfuris — ana scr. ij
Ceræ q.s.[20].

As all "seminaria" of contagions infect *materia*[21] analagous to themselves and corrupt it, it naturally follows that by the processes of the disease part of the materia will be made ready for corruption, part actually corrupted: consequently, it is necessary to proceed with medicaments which prevent putrefaction[22] and also with those which evacuate. The best of all the evacuants are the Hieræ[23], either that of Archigenes or that called Diacolocynthidos—also Hellebore than which there is nothing better in this affection if it be exhibited in whey (*sero lactis*). Epithymum is also effective and generally whatever medicines purge the melancholic humor.

The contagion is also prevented by proper exsiccatives, amongst which by reason of its peculiar antipathy all praise the ashes of burnt River Crabs: they praise equally Gentian Root, taken either by itself or with the said powder in white wine—some mix in Thus (frankincense) also, of which medicine use is to be made in every stage of the disease. They also recommend the herb Alyssum, which was given its name because it causes a man to be "without rabies" (*a lussos*)—the Arabs call it Alguasce. Fracastoro

here discusses the different opinions among medical men as to which was the true Alyssum: Rubia, Aparine, Lilialis, Asperula, Syderitis Heraclea, Herba Sancti Joannis, Salvia, False Betonica, Heraclea pratensis—he decides that whatever may be made of Alyssum, those would make no mistake in his judgment who exhibited, in rabies, the lesser Rubia either contused or in a potion with vinegar—it is as useful against rabies as against serpents—nor would they make a mistake who administered Syderitis, because that is a marvellous exsiccant. He says, "Aetius praises Oxylapathum, which was used by a certain old man externally and internally: this is not, however the Oxylapathum which is called acetosa (for that is Oxalis) but that which has the pointed leaves and seed of the Lapatha" (Docks).

## Rabies in Dogs.

"Alcon[24] sive de Cura Canum Venaticorum" is a Latin dactylic hexameter poem of 180 verses: in it Fracastoro describes the best kinds of hunting dogs, their training and care including treatment when sick. The dog if bitten by a serpent knows what to do, what grass to seek, how to heal himself without assistance; but when he is bitten by a rabid animal "you must at once yourself add Idaean [25] pitch to rue-leaves and sour wine (*acrique Lyaeo*) and apply these medicaments to the injured part. And when a vile scabies feeds on the wretched limbs of your 'barkers' (Latrantum) and foully burns their miserable body, boil wax, abdomen of an ox,[26] tenacious resin and fresh butter slowly with the green leaves of the lentiscus, and anoint the infected members.

But at this time the prudent mind must be specially careful as, inflamed by madness, he now attacks on all sides, out of his mind, he bites his very master and gives an incurable wound. Accordingly, first of all tie him with a strong chain; then moisten the root of the field rose contused by a heavy stone, with the water of a living spring, so as to present the appearance of a drink made from dark linseed—that taken, they say the dog recovers his senses and becomes again tame, his rabies raving disappeared. Some contund wild figs and old lard; others direct ivy-leaves to be softened in boiling water[27] until one part in three is left and feed the rabid quadruped with the leaves themselves and the tepid water at day-break. But nothing is so effective as to cut out the first seeds of the disease at the very beginning with iron—for at the point where the tongue is seen to be joined to the innermost palate, a

poisonous worm in color like native gold, occupies the fauces, and drives the fierce Molossian [28] hounds to madness suffusing the mouth with venom. If one can cut that out with the knife (*ferro*) he will remove the potent cause of so much mischief and the stimulus of furor."[29]

And thus we leave the Renaissance scholar, poet, physician, mathematician, philosopher, whom an admirer truly describes:

> Longe vir unus omnium doctissimus
> Verona per quem non Maronis Mantuae
> Nec nostra pristis invident jam saecula,
> Virtute summam consecutus gloriam
> Jam grandis aero hic conditur *Frastorius*.

WILLIAM RENWICK RIDDELL.

Osgoode Hall, Toronto, December 2, 1922.

NOTES.

[1]My copies are of the Geneva edition, 1637, Typis Iacobi Stoer, and of the very beautiful Venice edition, 1584, Apud Iuntas—the latter presents difficulties to an inexperienced reader from its frequent contractions: the former has many misprints and makes Fracastoro guilty of solecisms of which he was incapable—he was the best Latinist of his age, an age of scholars.

The Venetian edition omits the "Alcon."

[2]The reference in Galen is in his "De Locis Affectis" (sometimes cited as "Diagnostica," Vol. VIII of Kuhn's monumental edition): in Lib. VI, Galen speaking of affections of the Uterus makes the statement in the Text.

Whether Rabies arises spontaneously cannot be said to be absolutely settled—few negatives can, and theory is against the supposition—nor if it does arise spontaneously is it certain that it is so in the dog alone.

The reference to Aristotle is De Hist. Animal.

[3]"Crasis" is the Greek "Krasis," corresponding to the Latin "Temperamentum," both meaning a mixture of two substances in which the constituents lose their identity like wine and water as distinguished from a mixture in which the identity is retained, like peas and wheat—this the Greeks called "Mixis," in Latin "Mistus" or "Mixtus."

Our words "temperament", "humor", "sanguine", "phlegmatic", "choleric", "melancholy", etc., are the relics of the old theories of humors.

[4]Dioscorides (Pedanius or Pedacius) of Anazaraba probably in the 1st or 2nd Century, A.D. in his "De Venenatis Animalibus", VII, 2, says that the disease first makes its appearance on the fortieth day after the bite of the dog: Sir William Osler, "Prin. and Prac. Med." 5th Edit., 1903, pp. 227, 228, says from six weeks to two months, sometimes three months: he considers the prolongation of the incubation to a year or two years, not definitely settled.

[5]Osler, op. cit., pp. 228-9 gives three stages:—

1. Premonitory stage which Fracastoro ignores in man, when the patient is depressed and melancholy, has headache and loss of appetite, is irritable and sleepless with a constant sense of impending danger—the first symptoms of difficulty in swallowing are observable and a slight rise in temperature and pulse. Fracastoro recognizes this stage in dogs.
2. Stage of excitement described not very differently from our author.

3. Paralytic stage, dumb Rabies, lasting 6 to 18 hours, the patient is quiet, the spasms no longer appear, unconsciousness supervenes, the heart's action becomes weaker and death occurs by syncope. This last stage is described by Fracastoro in the vivid language—"Ac demum fatigati vitam miserabiliter effiant"—and at last, worn out, they miserably breathe out their existence.

[6]The "Canine Madness" of William Youatt (1776-1847), published in 1830, practically a reprint of Articles contributed to the "Veterinarian" must always remain the mine of information on this subject—the author, a distinguished Veterinary Surgeon, was a competent and careful observer, and had the faculty of expressing himself in clear and unambiguous language. The best pre-Pasteur article on Hydrophobia with which I am acquainted is by J. Scoffern, M.B., Lond., formerly Professor of Chemistry and Forensic Medicine at the Aldersgate College of Medicine in his interesting "Stray Leaves of Science and Folk-lore," London, 1870, better known half a century ago than at present but not yet quite out of date.

It must not be forgotten that Pasteur is quite modern: his first inoculation of the human subject for hydrophobia was performed on Joseph Meister, July 7-16, 1885: four children of Newark, N.J., were inoculated by him, December 21, completed January 1, 1886; and returned home January 14, 1886 in safety.

[7]This is not so very unlike our Bacteria, Spirillæ, etc.: but the terminology is odd. Fracastoro does not, so far as appears, accept all the consequences of the theory of Lucretius.

[8]Anything that cannot be referred to a material basis is spiritual—and such must be all agencies acting at a distance. The mythical Catablepha—the word does not occur in any of the dictionaries at hand, Greek, Latin, English, French, German, Italian, or Spanish, neither Stephanus nor Du Cange knows it—is no doubt the Basilisk ("Catablepha" is regularly derived from "kata" against the "blepo" I look). In his "De Sympathiâ", etc. "Cap. IX, Fracastoro answering his own question, "Cur Catablepha homimem ad mille passus conspectum interficiat?" says that its glance is a "spiritual species which is projected to a great distance from itself and on account of the contrariety and antipathy which it has to the spirits of man, it dissolves them and drives them away, whereupon the man dies, too." As like attracts like, so unlike repels unlike: the "spiritual species" of the glance of the catablepha repels the unlike natural or vital spirits of the man, drive them out from the man and he dies.

[9]So long as the insensible particles of a putrefaction are separate, they are harmless—consequently the particles of a rabies putrefaction being very little viscid and therefore non-agglutinative, do no harm outside the body: they require the wetness of the blood to enable them to agglutinate. And they are too large to make their way into the pores of the skin and through them into the blood.

[10]The sorb is the *Pyrus domestica*: on this Continent we have a near relative, the Mountain-Ash, of which the European species, *Pyrus aucuparia*, the Rowan-Tree, had magical qualities in Scotland and elsewhere. Pliny mentions the Sorb, N.H., XVI, 18, 30, 74, but says nothing of this peculiarity.

[11]The spelling "hidrophoui" is found in both editions: but "u" and "v" are the same letter, the form "v" being used as an initial and capital, "u" in all other cases—the word we should now print "Hidrophovi".

[12]Aetius, a very able Greek physician (A.D. 502-575), often called a quack—he wrote much chiefly a compilation of the works of others. See Bass, Hist. Med., Am. Ed., pp. 201, 202. Aetius recommended the Pimpernel, Anagallis Phoenicea, in Hydrophobia. It is said by the American editor of Bass, p, 202, n. 1, that "a decoction of this plant in beer is said to be the chief ingredient of 'Stoy's Medicine for Hydrophobia'." Our common Pimpernel, Anagallis arvensis, is either the same plant or practically indistinguishable.

[13]This was a common idea—the very learned editor of Stephanus' Thesacurus Graecae Linguae, London, 1924, says, Vol. VI, 9336a, that some of those who had investigated the causes of this fear of water consider that the

afflicted man imagines that he sees in the water as in a mirror the reflection of himself with red face, and eyes wild and non-human: but "alii dicunt in iis fieri hydrophobiam, quod canis, a quo morsi sint, imaginem in aqua cernere sibi videantur"—others say that the fear of water is produced in them because they seem to themselves to see in the water, the image of the dog by which they were bitten. He adds—"There are, moreover, those who say that an investigation of this would be idle; that this hydrophobia is nothing else but a kind of insanity from black bile."

It may be of interest to quote here a statement of the famous Lazarus Riverius (la Riviere, 1589-1655), whose Potio Riverii of Lemon Juice and Potassium Carbonate is not yet wholly forgotten—the Parisian Potio effervescens antiemetica dicta Riverii. I take the following from "The Practice of Physick . . . being chiefly a Translation of The Works of Lazarus Riverius . . . " by Nicholas Culpeper, Physitian and Astrologer, Abdiah Cole, Doctor of Physick, and William Rowland, Physitian, London, 1678, At p. 38 in the Chapter "Of a Phrenitis or Phrenzie" we read:—"So the Philosopher that was bit with a mad Dog, and his Imagination began to decay, going into a Bath, perceived the false Image of a Dog therein, but his Reason being sound reproved the error of his Imagination and made him speak thus: What had a Dog to do in a Bath? and presently he cast himself into the Bath by which means he was delivered from the danger of a Disease called *Hydrophobia* or fear of Water."

[14]In "De Sympathiâ, etc.", Chapter XX is "De Admiratione, et ecstasia et risu"; and the author gives many instances of phantasia, imagination, bringing up pictures and occasioning horror, admiration, etc.—the reasons are given, *more suo*.

[15]"Nervi" were more commonly tendons.

[16]Fracastoro gives Lib. III, Cap, 3, a list of Urentia, caustics: verdigris, auripigmentum, chalcitis, chalcanthum, sublimatum, praecipitatum, etc.—for an explanation of these words see note *post*.

[17]Pliny gives the credit of the discovery of the efficacy of a cabbage leaf applied to the spot against the bite of a dog to Epicharmus (circ. B.C. 540) who, the son of a physician of Cos, himself practised medicine for a time and then deserted the profession for comedy: he is said to have written 52 or 53 coomedies—a few fragments are still extant in Athenaeus and elsewhere.

[18]"Principium" and "principia" are used very loosely and often ambiguously by Fracastoro. Here they mean the stage of incubation—not Osler's "Premonitory stage".

[19]In many places Fracastoro warns against bleeding in certain cases because that would set the blood in motion and carry contagion further in. It is not easy for us to get into the atmosphere of those times with the blood stationary in the veins, the arteries full of air, animal or vital spirits carried along the nerves, etc.

[20]For these ingredients and names later in the Text see Glossary *infra*.

[21]"Materia" is substance.

[22]The chief anti-putrefactives of Fracastoro were the Resins, Pitch, etc.

[23]A "Hiera" was a purgative generally containing aloes. We still have "Hiera picra". Many of the old physicians had their own prescription amongst them. Archigenes of Apamaea (A.D. 48-117) mentioned by Juvenal, Sat. VI. 236; XIII, 98; XIV, 252: he was an Eclectic and in therapeutics, Empiric. The Hiera Diacolocymthidos was a compound Colocynth preparation: Dunglison, Medical Dictionary, New Edit., Phila., 1874, p. 501, gives a prescription.

[24]"Alcon" from Alcon son of Hippocoon, and one of those who took part in the hunt of the Calydonian boar: he was killed with his father and brothers by Hercules: Apollodorus, iii, 10, sec. 5.

[25]From Mount Ida in Phrygia—Oenone's "Mother Ida", the scene of the Choice of Paris so fatal to Troy.

[26]"Abdomenque bovis"—perhaps the udder of a cow as "abdomen porcae" was "sumen", udder of a sow.

[27]A poetical way of saying "boil".

[28]About the best hunting dogs were Molossian from Molossia, the eastern part of Epirus. Fracastoro in this poem says:—

* * * * de stirpe Molossa
Quaere canes, Lybicis illis, acresque Britannos"—
Seek dogs of the Molossian kind, with the Lybian and the fierce British.

[29]This venemous worm was known universally—indeed it is still in evidence in the country. Pliny tells us N.H., XXIX, 5, of the worm in the mouth of the dog called by the Greeks "lutta": if it be excised when the dog is young, it does not become rabid. This worm carried three times round the fire, is given to those who are bitten by a mad dog to prevent their becoming rabid. And probably this would be quite as effective as the Talmud's prescription of dog's liver, or Fracastoro's varied remedies—or even Stoy's Medicine for Hydrophobia, itself.

[30]"The one man by far the most learned, through whom Verona need not envy the Mantua of Maro (Vergil) nor our ages the older ones, this our great Frastorius having achieved the height of glory by his merit, is now the property of the ages."
It should not be forgotten that Verona was also the City of Celsus.

## GLOSSARY.

Alyssum: (from the Greek "a" privative, and "lussa," madness). A plant variously identified: our Alyssum or Madwort is either A. Maritimum, Sweet Alyssum, or A. saxatile, Rock Alyssum—generally the former.

In Fracastoro's time there was much contention among scholars and scientists as to whether Pliny and Dioscorides meant the same plant by the word Alyssum—the matter is still unsettled (my own opinion, for what little it may be worth, is that they did not).

Aparine: Galium Aparine, Goose Grass, Cleavers.

Aristolochia: Birthwort, several species are bitter, tonic, stimulant and aromatic, once believed to be emmenagogue and ecbolic.

Asperula: seems to have been a small variety of Aparine, *sed qu?*

Betonica: Betonica officinalis (Stachys Betonica) Betony. "False Betony" is either St. Paul's Betony, Veronica Serpyllifolia, or Water Betony, Scrophularia aquatica—here almost certainly the former.

Cera: Wax.

Epithymum: Cuscata epithymum, a kind of Dodder or parasitic plant growing on Thyme.

Euphorbium: A whole genus of the Spurge family is so-called: here it is Euphorbia Cyparissiana (or E. officinarum) Cypress Spurge.

Galbanum: Bubon galbanum (Linn.) or Ferula glabaniflua.

Gentiana: A whole family—the officinal gentian is generally known as G. lutes or G. rubra, yellow Gentian.

Heraclea: Panax Heracla, Opoponax.

Herba Sancti Iohannis: St. John's wort, Hypericum pyramidatum.

Iris: A whole family, the Flags—Fracastoro means the I. Germanica, the common Flower-de-Luce or the closely allied species, I. Florentina (from which we obtain Orris) and I. pallida.

Nitrum: Nitre, impure Sodium Nitrate, $KNO_3$.

Opopanax: Panax heraclea.

Rubia: Madder, Rubia tinctoria (or sativa). Rubia minor is petty madder, Crucianella.

Salvia: Sage, salvia officinalis.

Serapinum: (or Sagapenum) a bitter red to yellow gum smelling like garlic, once used as an antispasmodic, obtained from the Ferula Persica.

Sulfur: Sulphur, native preferred.

Syderitis (sideritis): Achillea Millefolium, common yarrow, nosebleed or milfoil.

Thus: Frankincense.

Xiris: Iris foetidissima, Stinking Iris, antispasmodic and narcotic.

# A Schick Campaign and Its Lessons

By Hugh Grant Rowell, M.D.,
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A SCHICK campaign presents nothing new or startling to the medical man to-day since the Schick is an established thing of known value. However, I have recently taken part in such a campaign and since it presents several unique features, I feel it is worth reporting.

In the 1921-1922 school year the New Bedford Board of Health decided upon an extensive Schick and immunization campaign and the work was done by Doctors Croacher, Doran and Canney, to whose excellent work and technic too much tribute cannot be paid. Upon my assuming charge of the medical work in the schools this work was taken over by my department to be completed, the re-Schicking not being done as it was not then due.

Late in the fall of 1922 an attempt was made to offer the re-Schick to such children as desired it, and out of thirty-three schools all but six had been completed when a measles epidemic prevented further activity temporarily.

The statistics of the work were as follows: Under the Board of Health in the public schools 4,175 tests were done, and of these 1,293 were negative and 248 were pseudos, or a tota of 1,541 whom we might call immune naturally. This left 2,534 positives to be immunized.

Of the 2,534 positives the Board of Health physicians gave the complete series of three toxin-antitoxin injections to 1,964, which is 77.1 per cent, and an excellent average to secure. A number of other children had one or two injections.

Here we must make a correction since I now took over the work and have been unable as yet to check up six schools which had a total of 383 positives of whom 252 were given three injections. This would leave 2,151 positives of whom 1712 had been immunized.

Of the 1,712 to be checked up by the second Schick Test, 891 gave permission, and of these 525 were negative, 160 were pseudos which gave a total of 685 successfully artificially immunized. This left 206 who were incompletely protected. Since an immunization

certificate was given to all children believed safe, the tests were read very carefully and a group of 56 showed an exceedingly slight but nevertheless positive action usually about the size of the head of a black pin. This group might be considered almost immunized but naturally could not be given a certificate to the effect that they were safe, although it would probably require very little further toxin-antitoxin to create the desired condition. Figuring in percentages with this close reading 76.88 per cent. were successfully immunized. Had we added the very slightly positive cases (which should not be done), this would have risen to 82.03 per cent.

While stress was laid on checking up the immunized cases, the test was available to all those who desired it, and 411 new children took it. Of these 214 were negative and 42 were pseudos or a total of 236 naturally immune. This left 155 positives to be immunized.

The Board of Health figures last year were 36.91 per cent. negative and 63.09 positive. It is interesting to note that with the very close reading this year, calling even the least reaction positive my percentages were 60.23 negative and 38.77 positive. The other series is larger, but I have no explanation to offer for the variation.

Figuring up the totals we have 1,541 shown to be naturally immune in the Board of Health cases, 256 in this year's series, and 685 of proved artificial immunity. This makes a known group of 2,482 children. The school population is a little over 17,000, of which then 14.6 per cent. is immune.

We have as yet found no case declared immune as a result of the Schick or the immunization series *plus the second Schick* where diphtheria has developed.

A number of important and interesting points came up during the campaign. Decision was made to give the whole matter the utmost publicity and the work was preceded several weeks by a series of newspaper articles. During the work a moving picture was taken of myself and assistant doing the test and the local audiences received it most favourably. The general comment seemed to be that if a child could smile during the whole test it couldn't be so bad. Little opposition was met except the customary circularizing of the teachers by certain opponents of this type of work.

No one was urged to have the test. Explanatory circulars were sent to the parents. If they did not wish it, that was all there was to it. We felt that a privilege was offered, and it was accepted as such. We found many parents anxious to have it

performed, and they frequently called my office to know when it could be done at their child's school.

I believe the most satisfactory way to give the test in any group is to have one person give the toxin and another the heated toxin. This avoids any possibility of confusion, since all material is kept separate. Also if the chairs are so placed that the most comfortable working position is that with the correct arm ready for injection, then another automatic check is added. With this technic the question of confusion is practically eliminated in an almost foolproof manner, and this is of special value when one sees a rare type of reaction where the heated toxin arm gives a slight reaction but the toxin arm shows nothing. This under these circumstances is surely a pseudo while otherwise one is always wondering if the syringes got mixed, however unlikely that might be. In other words, by the above method we avoid even semblance of error in technic.

Each child given the test was given a slip with a description of possible discomforts and given a nurse's number to call. She received no calls.

In a campaign it is unfortunate that through sickness in the child's family or through a cold or other unavoidable absence or other reason, a certain number of the children cannot have their arms read; this however cannot be remedied.

In one respect I do not agree with many authorities. I believe if you give this test you must do so under very strict aseptic precautions. For that reason each arm was thoroughly scrubbed up with green soap and water and then bathed in alcohol. This costs more, but certain arms are dirty anyway, and one misfortune from dirty or careless technic means you are not given the children the service you desire. Every possible care was used to avoid infection and the lack of it repaid the effort.

Certain children presented parents' permission and then declared the parent had changed his or her mind. If one child mentioned this, especially in very young children (who need the test worst) a sort of epidemic might arise. In all such cases we did not do the test, even when the parent offered to be present and see that the child behaved. Tales borne by young children are unfortunately sometimes not strictly the truth. Care in this matter likewise avoids discredit for the test.

When any history of recent disease was given, or even when any skin lesion, especially a septic one, existed, we dd not do the test. It is easier to delay than try to explain any trouble as a result of

existing conditions and not the Schick. The Schick being a new factor is given the blame. By this method we again avoided trouble.

If one remembers the little matters, in no way depending on the test, which can discredit it and avoids these, or in plain English if one uses a little horse sense, the test is simple, the technic is easy, and with the careful handling which it is getting at present, will retain its good repute.

Eventually I believe this work should be done by the family physician or the clinic, and I am sure all of us hope for the day when a Schick outfit will be as necessary as a thermometer.

The causes for failure to have the re-Schick were to a large extent the unfamiliarity with the test on the part of the parent and a belief that the work has already completed. The difficulty with all this work to-day is that the public in general are none too familiar with the newer medicine, and means have not yet been found to enlighten them. The solution lies through the family physician, the popular magazine and the press. It is not unlikely that the new popular medical magazine of the American Medical Association will fill a great need in such matters. At any rate, in spite of all our campaigns of education, we can still justify even greater measures to acquaint the laity with these great possibilities of benefit.

# Some Clinical Aspects of Industrial Poisoning

By N. C. Sharpe, B.A., M.B.

(*Continued from March Issue.*)

Amyl Acetate is an ingredient of the "banana oil" preparations used by painters and as a solvent for gums. The effects are usually stated to be those of the nitrite group—namely, headache, giddiness, confusion, drowsiness, nausea, disturbed digestion and palpitation. The Department of Toxicology recently had a case under observation where a museum curator had been using amyl acetate as a solvent for celluloid in the mounting of fish fins. His symptoms were pharyngitis and bronchitis, but without headache, nausea, fulness in head or eye trouble.

The men who complained of wood alcohol effects in shellacing had nausea, unsteadiness in fresh air, dizziness, groggy feeling, aching, smarting eyes, but in no case was there visual disturbance, dilated inactive pupils or changes in colour sense or in the colour fields. The distinguishing of colours and the limitation of colour fields are suggested as early tests of the effects of wood or methyl alcohol.

Rubber workers are exposed to numerous chemcals in different branches of the work. In rubber factories in Toronto aniline was not used. But the "blue men" of aniline poisoning have been reported as occurring in rubber works in Ontario towns. Poor ventilation and high temperature of workrooms play an important part in the production of this poisoning. By instructing the workman that as soon as he notices flushing of the face or nausea or severe headache it is time for him to seek the fresh air and to keep away from analine for the rest of the day, the premonitory symptoms soon disappear.

Antimony poisoning is a possibility in rubber works—it resembles lead poisoning. The chronic type shows nausea, abdominal pain, loss of appetite, diarrhoea, sores in the mouth, salivation, wasting and dizziness. No cases were seen in the Toronto district.

Hexamine tetramine has been used here as a catalyzer in rubber works, and cases of dermatitis have been caused by its use. Carbon bisulphide and carbon tetrachloride are also used as rubber solvents. The early symptoms of carbon bisulphide poisoning

usually consist of transient excitement and slight delirium very like alcoholic intoxication. Later deep depression comes on and if the exposure continues an increasing indifference, apathy or melancholy and weakened memory would develop. Drowsiness and stupidity would then sometimes pass suddenly into acute mania or into melancholia with delusions of persecution. These might terminate in recovery or end in incurable dementia. Such cases usually develop during the first few weeks or months of work. Carbon tetrachloride is less commonly used and is not nearly so severe in action.

Manganese poisoning is a possibility here, although I only know of its use in one plant, where dry batteries are made. But there, despite certain precautions, there was a great deal of the black dust in the mixing room. No case of poisoning has yet occurred as far as I could find out. One man employed for some time has two early symptoms, the languor and sleepiness, and occasionally laughter without cause. Clean cut symptoms are said to occur in one month; permanent disability after four months' exposure. Prevention is possible by working only in a dust free atmosphere, and removal cures early cases. The symptoms are, languor and sleepiness, stolid mask-like faces, low monotonous voice, muscular twitchings, cramps in calves and stiffness in the muscles of the legs, retropulsion and propulsion (an early sign is often that the man finds himself unable to walk down hill slowly), a peculiar slapping gait and occasional uncontrollable laughter or less frequently crying. There appears to be no life shortening process involved; long lived cripples are the rule.

Owing to impurities in the metal, arseniuretted hydrogen poisoning may occur in battery workers employed in the charging room, or possibly in any process where acid acts on metal when either one or both contain arsenic. No cases were found in Toronto. The symptoms are nausea and sickness occurring a few hours after exposure followed by almost continuous vomiting, jaundice, haematuria and in severe cases suppression of urine.

Mercury poisoning may occur in felt hat manufacturing and in furrier trades. The industrial type of poisoning does not have the early intense intestinal manifestations of acute poisoning, but has inflammation of the mouth cavity, pain in the mouth, difficulty in chewing and salivation in the early stages. Loss of appetite and slight diarrhoea may precede these symptoms. Another type of workman may show first the psychic disturbances, timidity, inabil-

ity to work in the presence of strangers, or irritability. Fine tremor of the hands and fingers or slight twitchings of the facial muscles are also early signs of poisoning. No cases of mercury poisoning were seen.

Occupational dermatitis was frequently found. Cases were seen due to fixing solutions in woollen dyes, chromic acid staining and turpentine in varnish rubbing of furniture, metol in photography, chrome ulceration in blue printing, ursol dye in furriers (and also the so-called ursol bronchial asthma) and to the use of denatured alcohol.

In so many cases of industrial poisoning from chemicals, the early subjective symptoms are the same, and there is no known early diagnostic test. This would indicate, then, that an intimate knowledge of the occupation and its risks are necessary for diagnosis in order to remove the man from danger of further absorption —and yet not to unnecessarily interfere with his work. In many of the cases of industrial poisoning (especially the slight acute intoxications from volatile bodies) either no physician is summoned or if he is, the man has frequently recovered by being placed in the fresh air alone. Yet although he seems to have fully recovered, repeated exposures and similar intoxications must undermine his health, and a knowledge of the occupation is necessary so that precautions may be suggested to do away with the exposure if at all possible.

[1]Legge and Goadby—"Lead Poisoning and Lead Absorption," p. 207.
[2]Hayhurst, E. R.—*American Journal of Medical Science*, 167. No. 6, p. 788.
[3]Harris, L. I.—Department of Health, City of New York, Reprint series No. 65. Aug., 1918.
[4]Oliver, T.—Allbutt and Rolleston, Vol. II., p. 988.
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# The Venereal Diseases in Industry

By Dr. J. J. Heagerty, *Chief Division of Venereal Disease Control, Dominion Department of Health, Ottawa.*

INDUSTRIAL physicians give two to ten per cent. as the venereal disease incidence among industrial workers. This would appear to be somewhat low when one considers the usual estimates, and the fact that the majority of men in the industries are of an age when venereal disease incidence is the greatest. It is difficult to make an accurate estimate as the infected employee hides his disease through fear of dismissal. Whenever a systematic investigation has been made, the incidence has been found higher than the figures given. Venereal diseases are common to all classes of workmen, but are more common among unskilled labourers. Syphilis appears as a primary or contributory cause of death in 27% of 1,183 autopsies at the Islip State Hospital, Long Island. Unskilled labourers form a large percentage of all autopsies. The ratio of gonorrhoea to syphilis would appear to be about four to one. These figures apply to male labourers only.

The employee who is suffering from gonorrhoea is a financial loss to his employer as long as his disease continues, for he is unable to work to capacity during that entire time. Apart from the actual pain of the acute stage, he suffers from lassitude, weakness and mental fatigue, which make continued effort at high pitch utterly impossible.

Of syphilis, Oliver says: "It causes a sufficient decrease in the efficiency of the working world to rank it as one of the most important economic problems in industry."

Syphilis weakens and disables, even kills, at the very time when the skill and earning capacity of the employee should be at their greatest; at a time when he should be of the greatest value to his employer, the community and his family. The value of the syphilitic employee to the employer is very considerably less than that of the non-syphilitic and the higher in the scale and the greater the wage, the more marked this becomes. The syphilitic workman suffers quickly from fatigue with concomitant diminution in energy and diminished power of concentration, with the result that his

output is diminished both in quantity and quality. One of the most important causes of accidents and of the loss of working time due to sickness is fatigue arising directly from industrial work. The importance of fatigue in the causation of accidents is emphasized by many investigations.

Adverse influences, such as bad lighting and bad ventilation, have a deleterious influence upon the syphilitic. There is an abnormal sickness and mortality rate attached to certain industries, such as pottery, stone quarries and file-making, and the syphilitic should not work at any of them, as syphilis lowers the vitality and renders the body more liable to deleterious influences. The syphilitic worker begins his day with a physical handicap, and his reserve force is rapidly used up. He gives a minimum output with a maximum effort. The rest periods which are so beneficial to the healthy worker are not so to the syphilitic workman. The type of work materially influences the progress of the disease. Aneurysms are more common among workmen who are doing heavy lifting and neuro-syphilis among the brain workers. All other influences being equal, the life of the syphilitic is shorter than that of the non-syphilitic.

The two most dangerous forms of syphilis are the cardiac and the nervous. These forms progress insidiously during the period of so-called latency, and are frequently far advanced before they are recognized. They are pregnant with danger, not only for the syphilitic individual, but for those with whom he comes in daily contact, as the following case, quoted by Bordley, shows. A man suffering from syphilitic disease of the heart, who was operating the lifting cage in a mine, died suddenly with the result that the occupants of the cage were grievously injured. Heart disease is one of the greatest of the disabling diseases. It seldom arises *de novo*, but is usually secondary to some other condition. The heart affection reacts upon the nervous system and produces fatigue and irritability—causes of accidents. Most writers on the subject of heart disease agree that syphilis is the commonest causative factor in aortitis. Of 37 cases of aortitis studied by Campbell of Belfast, syphilis was found to be the causal factor in 31 cases. The age incidence was greatest between 40 and 50 years. With most cases of aortitis there is an accompanying history of fatigue. The victims are listless and lack the inclination to exertion. There is a lassitude and depression which interfers very materially with their capacity for work. Psychosis, which frequently accompanies syphilitic cardiac disease, is evidenced by

irritability, apprehension, depression and memory defects. The resistance of these individuals is lowered and they are prone to suffer from attacks of minor illnesses, which occasion a considerable loss of time. Aortic cases are liable to transient attacks of giddiness, during which an accident may occur. Mental and emotional stresses may cause a cardiac case to break down as well as physical overwork. Two per cent. of industrial workers have serious heart lesions. As a result of an analysis, by Hala of Brooklyn, of 1,088 cases of death coming to autopsy, it was found that 21.41% showed evidence of syphilis. Cardio-vascular diseases among the adults showed the highest incidence.

Cerebrospinal syphilis is a not uncommon cause of epileptiform attacks in which the employee has suffered permanent injury or caused serious injury to others. Mock reports a death and a serious injury in a steel mill from an overhead crane, both due to defective vision of the operator of the crane, the result of neurosyphilis. It was found that the vision of the operator of the crane was so defective that he had no idea of perspective. One can readily see the importance of the presence of syphilis in the train engineer, the motorman, chauffeur, etc. Head injuries in the syphilitic may result in the development of general paralysis and is of medico-legal importance. Of the 1,183 autopsies at the Islip State Hospital, the primary cause of death was given as cerebral syphilis in 30, and general paresis in 292. It was also shown that general paralysis was a contributing cause in 238 and syphilis in 65 more; a grand total of 625 in 1,183 autopsies.

The development of neurosis and psychosis following minor injuries is apt to occur in the syphilitic. Syphilitic tissue which has been subjected to trauma does not heal as readily as normal tissue. Experience during the war showed that trauma was very often a determining factor in the production of syphilitic lesions. In the production of a gumma spirochaetes must be present either from a previous localization or be brought to the part by a blood effusion caused by the trauma. Pasini reports five cases of gummata following trauma that came under his observation: the first in multiple form in the hypodermic punctures in a drug addict; the second and third in the nates in the injection scars from insoluble mercurial salts; the fourth in the cranial region after a fall, and the fifth in a tibial-personal bone callus after a compound fracture from the bursting of a shell. The industrial physician should recognize the fact that injury is a precipitating cause of general paralysis. The risk of employing a neurosyphilitic is great, such an employee

should never be given a position such as an engineer, or any position of a hazardous nature.

The difficulty of distinguishing between cerebral syphilis and malingering may require a considerable amount of skill. The case is given of an employee who reported to the physician for a head injury, saying that a box had fallen from a shelf and struck him on the head. Two weeks later he again reported with a slight contusion of the cheek, due to a fall, later he reported a scalp wound, due to falling down stairs. A Wassermann test showed that the man was syphilitic and, finally, he confessed that he frequently fell without knowing the cause. He was suffering from cerebrospinal syphilis, which caused his epileptiform attacks.

Industrial accidents are more numerous than is generally thought, and their number should be reduced as much as possible. Burnham, in a survey of 25 factories, with a total of 2,291 employees, in the central part of New York State, found that there were 445 accidents each year. The chief inspector of factories for Great Britain shows that during 1920 there were 138,783 accidents, 1,404 of which were fatal. In 1921 there were 95,565 accidents with 951 fatal results. Quirk says that men often report in the shop hospital with lesions ranging from primary to late tertiary syphilis, claiming them as injuries and disabiltes contracted in the course of their work. These manifestations are a serious charge against industry through loss of time and work. The mass of the world's sickness is practically confined to the workers, yet the amount of work lost by the healthy worker through illness is only from seven to nine working days a year, and the most of this is due to preventable minor illnesses. The time lost by the so-called latent syphilitic is greatly in excess of this.

Accidents due to fatigue, speeding up work and prolonged hours of labour are increased by syphilis, due in great measure to a diminution in the precision and alertness with which the body responds to the necessities of the work. Every accident which lays a man off for a time means that the employer loses the man's work; the man for the time becomes a charge on the community and compensation must be paid; hence the economic loss is great.

It should be our endeavour to reach employees in as great numbers as possible, and point out to them the dangers of venereal diseases, and the possibility of grave complications where treatment has been neglected. At the same time, the fact that free examinations and free treatment are provided in our clinics

throughout the country might be with advantage emphasized. The employer should have some knowledge of the economic loss due to venereal diseases and the advantages that would accrue from periodical examination of his employees.

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Klauder, (Syphilis and Trauma, J.A.M.A., April 8th, 1922.)
Reports of the United States Public Health Service, December 30th, 1921.
Hala, Incidence of Syphilis, (American Journal of Syphilis, Oct., 1922.)
Gonorrhoea and Syphilis in Industry, Snow, (Nation's Health, August 15th, 1922.)

# News Notes

The final meeting of the Section of Preventive Medicine and Hygiene, Toronto Academy of Medicine, was held on March 22nd. Officers were elected for the coming year as follows: Chairman, Dr. H. C. Cruikshanks; Secretary, Dr. D. Fraser; Editor, Dr. J. T. Phair.

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Dr. C. J. O. Hastings, Medical Officer of Health, Toronto, has gone to Florida for a month's vacation.

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Alex. White, Chief Sanitary Inspector for the Province of Ontario, states that lumber camps were never in a better condition than during the past season, and that the new system of standards are proving a great boon to capital and labour alike.

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The Sanitary Inspectors' Association of Canada is endeavoouring to arrange a merging of their public health interests with that of the Canadian Public Health Association, and state much is expected by such a fusion.

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Dr. R. W. Bell, Provincial Medical Inspector, Provincial Board of Health, Ontario, has returned from the trip to Bermuda where he went to recuperate after a recent illness.

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The preliminary arrangements for the portion of the Canadian Public Health Congress in Edmonton, Alberta, Tuesday, Wednesday and Thursday, June 12th, 13th and 14th, for which the Canadian Tuberculosis Association is responsible, have progressed very favourably. Ten speakers from all parts of Canada will contribute papers devoted to tuberculosis at the special session, Tuesday morning in the MacDonald Hotel. Their subjects will be announced shortly. A ten-minute synopsis of their papers only will be presented. The papers in full will be available in printed form to aid in the discussion. The annual meeting of the Association will be held at luncheon or dinner hour Tuesday. A leading Canadian tuberculosis expert will address the general session on Tuesday afternoon, and another Canadian expert will address the similar session on Wednesday afternoon. Two outstanding authorities from the National Tuberculosis Association will give addresses at the respective evening public meetings of Tuesday and Wednesday. A splendid attendance of tuberculosis workers seems assured, and interest in the meeting is evident to a splendid degree.

The Toronto Social Hygiene Council is in the midst of a drive for 5,000 members. The Council expects to issue a monthly publication for the information of local members in the near future.

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The Canadian Social Hygiene Council will undertake campaigns in the Provinces of Manitoba, Saskatchewan and Alberta in the near future.

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Plans are under way for a carefully organized series of papers in the Section on Social Hygiene at the C.P.H.A. meeting in Edmonton. Papers are expected from Dr. J. J. Heagerty, Ottawa, Chairman of the Section; Dr. A. H. Desloges, Montreal; Miss Francis Brown, of Toronto; Dr. Gordon Bates, Toronto; Professor J. A. Dale, Toronto; and Mr. Justice Riddell, Toronto, President of the Canadian Social Hygiene Council.

It is expected that Mrs. Pankhurst will address one of the public meetings. It is possible that this meeting will cover the whole subject of Social Hygiene with the three speakers who spoke in New Brunswick: Mrs. Pankhurst, Dr. Gordon Bates and Dr. Heagerty.

It is hoped that in the Section Meeting it will be possible to show slides of stained Spirochaetes, tissues, etc., as well as the various stages of the Wassermann reaction.

Further announcements will be made in the next issue.

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Canadian social welfare agencies are planning to send a large delegation from the various Provinces of the Dominion to the fiftieth anniversary session of the National Conference of Social Work which will be held in Washington, D.C., May 16-23.

More than ordinary interest exists in the Conference this year because Toronto is one of the strongest contenders for the selection as the meeting place of next year's Conference. The Conference has met in Canada only once before, in 1897, at Toronto. Toronto extended an urgent invitation to be designated for the meeting place this year, but it was felt by the Conference that its semi-centennial might more appropriately be held in Washington, the Capital City.

Numerous important Canadian persons are members of various committees for this year's session. Dr. C. J. Hastings, Medical Officer of Health, Dept. of Public Health of Toronto, and Dr. C. M. Hincks, of Toronto, Associate Medical Director and Secretary of the Canadian National Committee for Mental Hygiene, are mem-

bers of the Committee on Health. Hon. W. R. Riddell, of Toronto, is a member of the Committee on Law and Government, and Rev. J. G. Shearer, General Secretary, Social Service Council of Canada, serves on the Committee on Industry. Dr. Helen MacMurchy, of Ottawa, Chief of the Division of Child Welfare of the Dept. of Health, and Brother Barnabas, of the Catholic Welfare Federation, Winnipeg, are members of the Committee on the School. Rev. G. C. Pidgeon, Minister of the Bloor Street Presbyterian Church, Toronto, is a member of the Committee on the Church, and Sir Robert A. Falconer, President of the University of Toronto, the Committee on Public Opinion.

Rev. Peter Bryce, who is Chairman of the Mothers' Allowance Commission of the Province of Ontario, is organizing the interest of Canadian social agencies and social workers in the Conference in order to promote membership and attendance.

Dr. L. P. Jacks, Principal of Manchester College, Oxford, England, has been invited as one of the European speakers and delegates.

The general subject of the Conference will be "Social Work in the Life of To-day." Each day of the convention will be devoted to a single topic—the relation between social service and law and government, health, the home, the church, industry, the school, and public opinion. The Conference will aim to show that social work is not a thing apart, but is very closely connected with these fundamental institutions of society, and that the subjects with which it deals have an especially important relation to government, especially the departments dealing with its dependent wards.

Five thousand delegates from Canada, the United States, Cuba, Hawaii, and the Philippine Islands are expected at the meeting. Persons of outstanding ability and wide reputation will be on the programme.

Herbert Hoover, Secretary of Commerce of the United States, is Chairman of the local Committee on Arrangements in Washington.

Reduced rates of railroad fares from Canada have been secured for the meeting from all stations in the Canadian Passenger Assotion, Eastern lines territory, viz.: points in Canada east of and including Armstrong and Port Arthur, Ontario. Requests for information about railroad rates and about the convention should be addressed to William E. Parker, Secretary, National Conference of Social Work, 1714 Pennsylvania Avenue, Washington, D.C., or Rev. Peter Bryce, 73 Grosvenor Street, Toronto.


# The Provincial Board of Health of Ontario

## COMMUNICABLE DISEASES REPORTED FOR PROVINCE FOR THE MONTH OF MARCH, 1923.

### Comparative Table.

| Diseases. | March, 1923. Cases. | Deaths. | March, 1922. Cases. | Deaths. |
|---|---|---|---|---|
| Small-pox | 26 | 0 | 113 | 0 |
| Scarlet Fever | 343 | 17 | 446 | 18 |
| Diphtheria | 224 | 29 | 320 | 32 |
| Measles | 1,227 | 9 | 695 | 4 |
| Whooping Cough | 432 | 24 | 61 | 13 |
| xTyphoid | 557 | 22 | 21 | 11 |
| Tuberculosis | 187 | 128 | 172 | 136 |
| Infantile Paralysis | ..... | ..... | ..... | ..... |
| Cerebro Spinal Meningitis | 12 | 10 | 8 | 7 |
| Influenza | ..... | 317 | ..... | ..... |
| Influenzal Pneumonia | ..... | 66 | ..... | 84 |
| Pneumonia | ..... | 540 | ..... | 409 |
| Syphilis | 161 | ..... | 218 | ..... |
| Gonorrhoea | 178 | ..... | 252 | ..... |
| Chancroid | ..... | ..... | 4 | ..... |

xOutbreak at Cochrane 520 cases, 11 deaths.

# Dr. W. L. Hutton is Awarded Increase from $3,000 to $3,600

JUDGMENT GIVEN OUT BY HIS HONOR JUDGE HARDY—THE COMPLETE TEXT OF THE JUDGMENT AS PRESENTED—FINDS $3,600 A FAIR AND REASONABLE AMOUNT.

JUDGMENT was given out by His Honor Judge Hardy in the application of Dr. W. L. Hutton, M. O. H., for increased salary. The judgment awards him an increase from $3,000 to $3,600. He had applied to the city for $5,000.

The complete judgment follows:

In the matter of the application of William L. Hutton, M.D., M.O.H., for the City of Brantford.

This is an application by the above-named medical officer of health under the provisions of the Public Health Act, ch. 218, R.S.O., 1914, and amending Acts to have determined the amount of compensation to which he is entitled for services as such official for the City of Brantford.

The sections of the Act directly bearing on the application are sections 39 and 52a.

Section 39 provides that every medical officer of health, whether appointed by the council or by the Lieutenant-Governor in Council, shall be paid by the municipal corporation a reasonable salary to be fixed by by-law.

Section 52a provides *inter alia* that where a medical officer of health claims that the salary paid to him by a municipal corporation is not fair and reasonable he may, after giving such notice as provided in the section, apply to the Judge of the County Court for an order fixing the amount payable to him as salary and upon such application the Judge shall hear the parties and their witnesses and shall make such order as he may deem just and in such order shall settle and determine the salary properly payable to such medical officer of health.

Section 52a, Sub-section 3, provides that the Judge upon the application, shall take into consideration all the circumstances of the case and amongst other matters the physical extent, population and assessment of the municipality.

On the hearing before me there was no contention in regard to the efficiency of the officer in question, it being admitted that no complaint was being put forward as to the capability and performance of the occupant of the office and that the issue was confined to the sole question of the sufficiency of the compensation.

I will first deal with the objection to the application being heard as put forward by counsel for the city on the ground that Dr. Hutton having by his agreement of June 24, 1919, approved by by-law 1539 of June 30, 1919, agreed to hold office during the pleasure of the council and having bound himself to a salary of $3,000 per annum, that he has contracted himself out of the operation of the statute and is barred from making this application.

There would have been much force in this contention had there been in the agreement any reference to the provisions of the statute exempting them from operation, but the agreement on the other hand, specifically provides that the appointment is made in pursuance of the Public Health Act, a very inclusive term, and which embodies the provisions under which the application is here made.

Further, the corporation has from time to time undertaken to vary the contract, having in 1921 increased the salary beyond that fixed by contract and in 1922 placed it below that sum.

The corporation, therefore, cannot now very well be heard to say that the terms of the contract can only be altered by one party to the agreement and that the applicant is deprived of any rights he may have given him by the statute.

I therefore proceed to determine the main question, what is a reasonable remuneration to be allowed for a full-time medical officer of health, the hearing before me having proceeded on the basis of a full-time officer of health, a part-time officer not being discussed.

A considerable volume of evidence was put in both viva voce and documentary, disclosing the character and extent of the duties of a full-time officer, of which I think it would be more satisfactory if I were to mention the cardinal features.

The act lays upon the M. O. H. responsibility for the due carrying out of the act, and among other duties, for the purity of the milk and water supplies and the due safeguarding of the citizen in the disposal of public sewerage. Dr. McCullough, Chief M. O. H. for Ontario, in his evidence, was very emphatic in his declaration that what Dr. Hutton had accomplished in regard to the milk supply was alone worth his salary, which he considered should be $4,000. Dr. McClenneghan, District H. O., putting it at $4,500.

Dr. Hutton claims that when he returned from overseas in 1919 and accepted the position at $3,000, it was fully expected that the cost of living would shortly resume pre-war prices. This had not been realized and he and his family were unable to live on the present salary.

In 1921, 284 tests of milk were made, the butter fat being increased 23 per cent. over the previous year, increasing the supply of cream thereby to the consumers of milk by 12,147 quarts, of the value of $7,884. In 1922, 429 tests were made, the improvement being continuous.

The water supply has been subject to continual tests, the city being free of typhoid, 478 bacteriological examinations having been made.

In 1921, 1,500 were vaccinated for smallpox, during which the medical health officer was in attendance on 214 cases.

Infectious diseases among school children have demanded much attention in the past two years, over 2,000 exclusion notices were issued, each case requiring careful diagnosis and examination. This system has been organized by Dr. Hutton and during the past three years he has dealt with a yearly average of 768 cases of infectious diseases

Investigations as to sanitary housing conditions.

Establishing of venereal disease clinic.

The study of cases and prevention of diphtheria.

Tuberculosis and venereal diseases, and making 448 laboratory analysis in the past year.

There is also a continuous demand for services in those agencies of preventive medicine connected with the Social Service League, Red Cross Society, examination of under-nourished children, and other remedial agencies.

There is much to be done in furthering health propaganda and in giving the public information by addresses and otherwise for maintaining the standard of community health.

According to the testimony of Dr. McCullough, efficiency cannot be obtained from a part-time officer, that it is necessary to have permanency and continuity in service to obtain results, that the longer an officer has experience in the work, coupled with his study of local conditions, the more valuable he becomes, and that he viewed Dr. Hutton's work in Brantford as exceedingly satisfactory.

He considered the eight full-time officers in Ontario much underpaid and gave the following salaries as paid by the following municipalities:

| City. | Popltn. | Sal. | Cost per head. |
|---|---|---|---|
| Brantford | 31,362 | $2,960.00 | .43 |
| Ottawa | 107,843 | 5,000.00 | 1.64 |
| Essex Border Municipalities | 60,000 | 5,000.00 | .60 |
| London | 69,959 | 5,000.00 | .35 |
| Fort William | 19,886 | 3,725.00 | .84 |
| Port Arthur | 15,094 | 3,300.00 | 1.15 |
| Hamilton | 108,143 | 5,000.00 | .57 |
| Toronto | 449,278 | 8,000.00 | |
| Asst. | | 6,000.00 | 1.65 |

In Hamilton the officer has 33 assistants, in Brantford, there are three.

Having heard the arguments of counsel and having duly considered the evidence submitted and weighed the factors prescribed by statute, the area of the city, its population and assessed value, not omitting such other circumstances as the prevailing rate of taxation, the continued high cost of living, the special training and skill demanded in the execution of his office, the extent and quality of the service rendered and the amounts paid for similar service by other municipalities, I am of opinion that the sum of thirty-six hundred dollars ($3,600) per annum is, under existing conditions, a fair and reasonable sum to be paid the applicant for services as medical officer of health for the City of Brantford.

And I fix the 1st day of March next as the period from which the said rate of compensation is to commence, and the order will issue accordingly.

A. D. HARDY,
Judge, County Court of Brant.

Brantford, Feb. 21, 1923.

# Notes on Current Literature

From the Health Information Service, Canadian Red Cross Society.

*Administration of Health Departments.*

A section from the forthcoming report of the Committee on Municipal Health Department Practice of the American Public Health Association. "American Journal of Public Health," March, 1923, page 163.

*Epidemiology and Health Departments.*

The importance of epidemiology as a function of health departments, by Wade H. Frost, M.D., Surgeon, United States Public Health Service. "The Medical Officer," March 10th, 1923, page 113.

*How Sanitation Aids Public Health.*

An address delivered at the recent Public Health Exposition in New York City on the importance of water supply, sewage and garbage disposal in the promotion of public health. "Monthly Bulletin of the Department of Health, New York City," February, 1923.

*Health Score for School Children.*

The report of the United States Public Health Service for February 16th, 1923, contains a description of a new score chart for school children and the method of use.

*Milk Supply.*

Town and country milk supplies: What is needed for their improvement. By John Robertson, C.M.G., O.B.E., M.D.,B.Sc., Medical Officer of Health for the city of Birmingham, Professor of Public Health in the University of Birmingham. "The Medical Officer," February 10th, 1923, page 63.

*Home Care of Communicable Diseases.*

By Miss Clara D. Noyes, American Red Cross. "The Health Builder," April, 1923, page 471.

*Industrial Fatigue.*

Fatigue as a factor in causing disease as well as social and economic loss. By Louis I. Harris, M.D., Director, Bureau of Preventable Diseases, New York City Department of Health. "Monthly Bulletin of the Department of Health, New York City," January, 1923, page 7.

*Industrial Medicine in* 1922.

A review of the progress of industrial medicine in 1922, by W. Irving Clark, Jr., M.D., Medical Director, Norton Company, Worcester, Mass. "The Journal of Industrial Hygiene," March, 1923, p. 474.

*The Control of Cancer.*

An address presented before the Academy of Medicine, Toronto, by Colonel Alexander Primrose, Professor of Clinical Surgery, University of Toronto. "The Canadian Medical Association Journal," March, 1923, page 160.

*Drug Addiction.*

The Truth About Drug Addicts," by Thomas S. Blair, M.D., Chief, Bureau of Drug Control, State Department of Health, Harrisburg, Pa. "Health," March, 1923, page 27.

*Health Visitors.*

A general account of the work of a health visitor in England. "Maternity and Child Welfare," March, 1923, page 89.

*Public Health Nursing.*

The work of the public health nurse in rural districts in controlling communicable diseases. "The Public Health Nurse," March, 1923, page 122.

# Book Reviews

*Animal Parasites and Human Disease.* Asa C. Chandler, John Wiley & Sons. Second Edition, 1922. Price, $4.50.

The growing importance of Parasitology with reference to human disease has made it essential for all those interested directly or indirectly with public health to have some knowledge of the subject. The prevention and control of Malaria and Hookworm Disease in America alone constitutes such an enormous problem that measures that are adopted for its achievement should be known both to the economist and those associated with preventive medicine. The book has been written in a style such that the non-scientifically trained person may readily grasp the significance of the subject. The principles underlying the spread and control of parasitic diseases are clearly outlined. The author has succeeded in portraying some of the romance of discovery and the self-sacrificing devotion of experimenters in this field. The seconod edition has new material added. The subjects of Amoebiasis, Yellow Fever, Typhus and Trench Fever have been brought up to date.

The book comprises over five hundred and fifty pages, well illustrated with some two hundred and fifty figures. As a text or reference book it is well adapted for use in medical schools.

# Editorial

## THE ANNUAL MEETING.

On the 12th, 13th and 14th of June the Annual Meeting of the Canadian Public Health Association will take place in Edmonton, and it is to be hoped that many members of the Association will take advantage of the opportunity to unite with their fellows interested in the great cause of public health and to discuss the many problems envolved.

The trip through the Great West will provide an opportunity for many Easterners to get a new conception of the vastness of Canada. Old friends will meet, old difficulties will be overcome and new ideas will be gained at the interesting sessions being planned by the local committee. A detailed account of the programme is not yet available, but will appear in the next number of the PUBLIC HEALTH JOURNAL.

## NEW CONCEPTIONS.

There is no question but that in the profession of medicine today great changes are imminent. We stand at the parting of the ways. Organized curative medicine interpreted as the ideal form of organization for the profession has had its day. Preventive medicine must be the ideal of the physician of the future.

Sir James MacKenzie, in his recent book, "The Future of Medicine" as quoted in *Public Health*, the organ of the Michigan Department of Health, pictures disease processes as falling into four distinct stages.

First: The Predisposing Stage. The stage in which the individual is as yet *free* from actual disease, but liable to be attacked either from some inherent weakness or from some outside source.

Second: The (true) Early Stage. When the disease has entered the system, but has not produced as yet any perceptible alteration of tissue and the signs the disease produces are mainly subjective or symptomatic—and states that *this* is the curable stage.

Third: The Advanced Stage. Destruction or modification of tissue and its presence revealed by physical stages.

Fourth: The Final Stage. When the patient is dead and post mortem study is in order.

Sir James goes on to point out that the chief end in medicine to which all endeavours should be bent is the prevention and actual cure of disease, and that this objective has not been clearly recognized by medical men because their greatest efforts have been directed to the more urgent calls for the relief of suffering and already impaired health. The necessity for observation and advice for the average citizen before he becomes ill in order that he may remain well has obviously not been recognized by the average physician.

At the same time a group of physicians working largely in health departments have seen the necessity for early preventive methods and for the organization of advice and treatment in order that the spread of disease may be prevented, and incipient complaints dealt with before they become serious. This conception has resulted in a system of free supervision and treatment with the great aims of "prevention" in view.

Unfortunately, anything that is free or anything that is preventive, is greeted with suspicion by the more conservative type of physician who seems to feel that his practice is being interfered with, and that prevention is, to say the least, a freakish idea with which he certainly has no concern. Misunderstandings and friction have often resulted.

This state of affairs is almost inevitable in any transitory stage. The main thing to remember is that prevention must always be the ideal condition, and that as the machinery of prevention completed, will mean a saner, happier, healthier human race, so will the physician, a more useful citizen than ever, more richly deserve the encomiums and respect of his fellowmen. The economic phase will in due course take care of itself by gradual adjustment of methods of remuneration.

# Provisional Programme of the Ontario Health Officers' Association, May 21, 22 and 23, 1923

## Physics Building, University of Toronto, Toronto

### MONDAY.

*First Session—*

10 a.m.—Welcoming and registration of delegates.

10.30—Moving Picture.

11.00—Remarks by the Chief Officer of Health.

11.30—Dr. R. R. McClenahan, Director of Division of Preventable Diseases, Provincial Board of Health. "Method of handling a typhoid epidemic from the medical standpoint."

11.45—Mr. F. A. Dallyn, C.F., Director of the Division of Sanitary Engineering, Provincial Board of Health. "Method of handling typhoid epidemic from the Sanitary Engineer's standpoint."

12 noon—Address by representative of the Ontario Medical Association.

Luncheon—At Hart House at 1 p.m. (The members will be the guests of the Provincial Board of Health.)

*Second Session—*

2 p.m.—Presidential address, Dr. D. V. Currey, M.O.H., St. Catharines.

2.30—Mr. Wills MacLachlan, Toronto, "Resuscitation." Illustration of Schaefer method.

3.00—Dr. H. F. Vaughan, M.O.E., Detroit, Mich.

### TUESDAY.

*Third Session—*

9 a.m.—Moving picture.

9.30—Dr. James Roberts, M.O.H., Hamilton. "The Schick Test and Active Immunization against Diphtheria."

10.00—Dr. J. G. Cunningham, Director, Division of Industrial Hygiene, Provincial Board of Health. "The Part-time Physician in Industry."

11.00—Dr. W. L. Hutton, M.O.H., Brantford. "Smallpox."

11.30—Mr. F. A. Dallyn, C.E., Director of the Division of Sanitary Engineering, Provincial Board of Health, "Rural Water Supplies."

*Fourth Session—*

2 p.m.—Cancer Symposium.

A paper will be read by Dr. Adam Wright, ex-Professor of Obstetrics, University of Toronto, Chairman of the Provincial Board of Health. After the reading of Dr. Wright's paper a full discussion will be held with the following gentlemen taking up the subject from various angles: Surgical aspect—Professor Clarence Starr, University of Toronto. Medical aspect—Dr. Wm. Goldie, Toronto. Gynaecological aspect—Dr. F. A. Cleland, Toronto.

3.30—Dr. H. W. Hill, Western University, London, Ont., "Milk." Discussion will follow.

WEDNESDAY.

*Fifth Session—*

9.00 a.m.—Moving Picture.

9.30—Dr. H. Ross, M.O.H., Clifford, Ontario.

10 a.m.—Dr. H. S. Thompson, Dental Research Department, University of Toronto. "Dentistry and Health."

10.30—Symposium on Tuberculosis.

Dr. Harold Parsons, of Toronto, will deal with the subject under the heading of "Tuberculous Contacts." "The Pathology of Mediastinal Tuberculosis" will be discussed by Dr. I. H. Erb, pathologist to the Hospital for Sick Children, Toronto. "Tuberculous Infection in Infancy and its Effects" will be discussed by Dr. A. Davis, of Toronto. A discussion will follow.

*Sixth Session—*

2 p.m.—Mr. S. J. Manchester, Director of Vital Statistics, Registrar-General's Department. "Vital Statistics and Causes of Death."

2.30—Dr. F. G. Banting, University of Toronto. "Insulin in the Treatment of Diabetes."

D. V. CURREY, *President.*
T. A. LOMER, *Vice-President.*
J. J. MIDDLETON, *Secretary*